

Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A method for conveying network management information within a network, the method comprising:

receiving an Ethernet packet at a network element;

modifying the Ethernet packet by inserting a header in place of the a preamble within the packet while maintaining the Ethernet frame, said header configured to provide support for network management; and

transmitting the modified packet from the network element in the Ethernet frame.

Claim 2 (original): The method of claim 1 wherein the network element is in communication with an optical network.

Claim 3 (original): The method of claim 1 wherein said network management includes operations, administration, and maintenance.

Claim 4 (original): The method of claim 3 wherein the header comprises an operations, administration, and maintenance channel and further comprising transmitting operations, administration, and maintenance information from the network element to a network management station.

Claim 5 (original): The method of claim 3 wherein the header comprises an operations, administration, and maintenance channel and further comprising

transmitting operations, administration, and maintenance information from the network element to other network elements.

Claim 6 (original): The method of claim 3 wherein said network management further includes provisioning of paths within the network.

Claim 7 (original): The method of claim 3 wherein said network management further includes performance monitoring of paths within the network.

Claim 8 (currently amended): The method of claim 1 wherein said header includes the same number or a fewer number of bytes than the preamble of the Ethernet packet so that a the size of the packet is not increased when the preamble is replaced by the header.

Claim 9 (original): The method of claim 8 wherein said header comprises 8 bytes.

Claim 10 (original): The method of claim 1 wherein the network element is located on an edge of an optical network.

Claim 11 (original): The method of claim 1 wherein said header includes application specific information.

Claim 12 (original): The method of claim 1 wherein said header includes an error-detecting code word to detect errors in the header.

Claim 13 (original): The method of claim 12 wherein said error detecting code is a cyclic redundancy check field.

Claim 14 (original): The method of claim 1 wherein said header includes a message channel.

Claim 15 (original): The method of claim 14 further comprising using HDLC on the message channel.

Claim 16 (original): The method of claim 1 wherein said header includes packet type information.

Claim 17 (original): The method of claim 16 wherein the packet type information identifies whether the packet is an idle packet or a data packet.

Claim 18 (original): The method of claim 16 wherein the packet type information identifies that the Ethernet packet has been modified.

Claim 19 (original): The method of claim 1 further comprising providing sideband communication within the network via a sideband channel.

Claim 20 (original): The method of claim 19 further comprising IP routing over the sideband channel to enable communication of management data.

Claim 21 (original): The method of claim 19 further comprising using the sideband channel to perform topology discovery.

Claim 22 (original): The method of claim 1 wherein the network has a hub topology.

Claim 23 (original): The method of claim 1 wherein the network has a mesh topology.

Claim 24 (original): The method of claim 1 wherein the network has a ring topology.

Claim 25 (original): The method of claim 1 further comprising inserting an idle packet into a packet stream at the network element during periods when no data is received by the network element.

Claim 26 (original): The method of claim 1 further comprising removing said header and replacing the preamble in the modified packet.

Claim 27 (original): The method of claim 26 wherein removing said header comprises removing said header at an egress boundary of the network.

Claim 28 (original): The method of claim 1 wherein inserting said header comprises inserting said header at an edge of the network.

Claim 29 (original): The method of claim 1 further comprising transmitting a defect indicator within said header.

Claim 30 (original): The method of claim 29 further comprising switching a receiving node to a backup path.

Claim 31 (original): The method of claim 1 further comprising providing an automatic protection switching subchannel within said header.

Claim 32 (original): The method of claim 1 further comprising multiplexing packet streams at the network element.

Claim 33 (original): The method of claim 32 wherein said header comprises a subinterface identifier which identifies an originating port for each of the packets.

Claim 34 (original): The method of claim 32 further comprising demultiplexing the packet streams at a receiving node.

Claim 35 (original): The method of claim 1 wherein the network comprises a plurality of network elements.

Claim 36 (original): The method of claim 35 further comprising a network management station and wherein the management station has access to said plurality of network elements via said header.

Claim 37 (original): The method of claim 35 further comprising communicating routing table information among said plurality of network elements via said header.

Claim 38 (original): The method of claim 1 further comprising receiving the modified packet at a transit node, modifying said header, and forwarding the packet.

Claim 39 (original): The method of claim 1 wherein the network element is in communication with at least one host computer.

Claim 40 (original): The method of claim 1 wherein the network element is in communication with at least one router.

Claim 41 (original): A method for supporting management of a network, the method comprising:

receiving a modified Ethernet packet at a network element, the modified packet comprising a header configured to provide support for network management;
replacing the header in the modified packet with a preamble within the packet to create an Ethernet packet; and
transmitting the Ethernet packet from the network element.

Claim 42 (original): The method of claim 41 wherein the network element is located at an egress boundary of the network.

Claim 43 (original): The method of claim 41 wherein receiving a modified Ethernet packet comprises receiving the modified packet from a transit network element located within the network.

Claim 44 (original): The method of claim 43 wherein the network element is in communication with an optical network.

Claim 45 (currently amended): A An Ethernet network system for conveying network management information ~~in-a-network~~, the system having a network element comprising:

a port controller operable to receive a an Ethernet packet, modify the Ethernet packet by inserting a header in place of a the preamble within the packet while maintaining the Ethernet frame, said header configured to provide support for network management; and

a network element controller coupled to the port controller and operable to generate and consume network management information.

Claim 46 (original): The system of claim 45 wherein the port controller comprises an optical to electrical converter and a CDL handler operable to insert the header into the packet.

Claim 47 (original): The system of claim 45 further comprising a crossconnect configured to receive the packet from the port controller and select an egress port controller to transmit the packet from the network element.

Claim 48 (original): The system of claim 45 further comprising a second network element positioned at an egress boundary of the network, the second network element comprising:

a port controller operable to receive the modified packet and replace the header with the preamble; and

a network element controller coupled to the port controller and operable to generate and consume network management information.

Claim 49 (original): The system of claim 48 wherein the port controller comprises a CDL handler and an electrical to optical converter.

Claim 50 (original): The system of claim 48 wherein the port controller comprises a CDL handler and an optical to electrical converter.

Claim 51 (original): The system of claim 48 wherein the second network element is a downstream network element and further comprising a transit network

element operable to receive the modified packet, modify the header, and forward the packet to the second network element.

Claim 52 (original): The system of claim 45 wherein the header comprises:

- an operations, administration, and maintenance field;
- a message channel;
- an application specific field; and
- a header error detection field.

Claim 53 (currently amended): A computer program product for conveying network management information within a network, the product comprising:
code that modifies an Ethernet packet by inserting a header in place of ~~an~~
~~the~~ Ethernet preamble within the packet while maintaining the Ethernet frame, said header providing support for network management;
code that transmits the modified packet from a network element in the Ethernet frame; and
a computer-readable storage medium for storing the codes.

Claim 54 (original): The computer program product of claim 53 further comprising code that removes said header from the modified packet and replaces the preamble.

Claim 55 (original): The computer program product of claim 53 further comprising code that provides sideband communication within the network.

Claim 56 (original): The computer program product of claim 53 further comprising code that provides each of the packets with a subinterface identifier within said header to allow multiplexing of packet streams.

Claim 57 (currently amended): A system comprising:
a processor that executes a program for modifying an Ethernet packet to provide OAM capabilities, said program comprising:
code that modifies an Ethernet packet by inserting a header in place of ~~an~~ the Ethernet preamble within the packet while maintaining the Ethernet frame;
code that transmits the modified Ethernet packet over a path within a network; and
a computer-readable storage medium having said program stored thereon.

Claim 58 (original): A system for supporting network management, the system comprising a handler operable to remove a preamble from an Ethernet packet and insert a header, said header comprising:

an operations, administration, and maintenance field;
a message channel;
an application specific field; and
a header error detection field.

Claim 59 (original): The system of claim 58 wherein said header includes the same number or a fewer number of bytes than the preamble it replaced.

Claim 60 (original): The system of claim 58 wherein said header further comprises a defect indication field that instructs a receiving node to switch to a backup path.

Claim 61 (original): The system of claim 58 wherein the application specific field comprises a subinterface identifier for use in demultiplexing packet streams.

Claim 62 (currently amended): The system of claim 58 wherein the header error protection detection field is a header cyclic redundancy check.

Claim 63 (original): The system of claim 58 wherein the header includes fields for SRP.

Claim 64 (currently amended): A system for supporting management of a an Ethernet network, the system comprising a handler operable to wrap a digital wrapper around a data link layer, the digital wrapper comprising:

- an operations, administration, and maintenance field;
- a message channel;
- an application specific field; and
- a header error detection field.

Claim 65 (currently amended): A system for conveying network management information in an Ethernet system, the system comprising:

- means for receiving a an Ethernet packet at a network element;
- means for modifying a the preamble of the Ethernet packet to support network management while maintaining the Ethernet frame; and
- means for transmitting the modified Ethernet packet.

Claim 66 (original): The system of claim 65 wherein means for modifying the packet comprises hardware.

Claim 67 (original): The system of claim 65 wherein means for modifying the packet comprises microcode.

Claim 68 (original): The system of claim 65 wherein means for modifying the packet comprises software.

Claim 69 (original): The system of claim 65 wherein means for modifying the packet comprises photonic logic.

Claim 70 (original): The system of claim 65 wherein the network element is located at an ingress boundary of the network.

Claim 71 (original): The system of claim 70 wherein said means for modifying the preamble comprises means for replacing an Ethernet preamble with a CDL header.

Claim 72 (original): The system of claim 65 wherein the network element is located at an egress boundary of the network.

Claim 73 (original): The system of claim 65 wherein said means for modifying the preamble comprises means for replacing a CDL header with an Ethernet preamble.

Claim 74 (original): The system of claim 65 wherein the network element is a transit network element.

Claim 75 (new): The method of claim 1 wherein maintaining the Ethernet frame comprises maintaining the start of frame field.

Claim 76 (new): The method of claim 1 wherein maintaining the Ethernet frame comprises maintaining the interpacket gap.

Claim 77 (new): The method of claim 1 wherein the network element is configured for receiving and transmitting Ethernet frames and operations, administration, and maintenance information is contained within the Ethernet frame.

Claim 78 (new): The method of claim 1 wherein transmitting the modified packet comprises transmitting a packet without SONET overhead.

Claim 79 (new): The method of claim 1 wherein maintaining the Ethernet frame comprises maintaining the length of the preamble and the frame.

Claim 80 (new): The method of claim 45 wherein the port controller and the network element are configured for receiving and sending Ethernet frames.

Claim 81 (new): The method of claim 53 wherein maintaining the Ethernet frame comprises maintaining the start of frame field.

Claim 82 (new): The method of claim 53 wherein maintaining the Ethernet frame comprises maintaining the interpacket gap.

Claim 83 (new): The method of claim 53 wherein the network element is configured for receiving and transmitting Ethernet frames.

Claim 84 (new): The method of claim 41 wherein the network is a WAN.

Claim 85 (new): The method of claim 41 wherein the header is the same size as the preamble.

Claim 86 (new): The method of claim 41 wherein transmitting the Ethernet packet comprises transmitting the Ethernet packet without a SONET frame.

Claim 87 (new): The method of claim 41 wherein transmitting the Ethernet packet comprises transmitting the Ethernet packet without SONET overhead.

Claim 88 (new): The method of claim 41 wherein replacing the header comprises maintaining a minimum interpacket gap.

Claim 89 (new): The method of claim 41 further comprising transmitting back-to-back idle packets and separating the idle packets with a spacing equal to at least two times the minimum transmit interpacket gap.

Claim 90 (new): The method of claim 41 wherein replacing the header in the modified packet comprises preserving the Ethernet frame structure.